REMARKS

The present communication is responsive to the Official Action mailed September 17, 2003. A petition for a three-month extension of the term for response to said Official Action, to and including March 17, 2004, is transmitted herewith.

In response to the objection to claim 4, paragraph (b) of the claim has been amended to refer to "solder masses associated with at least some of said pairs," rather than "solder masses disposed at at least some of said pairs." This does not narrow the meaning of the claim in any way.

Claims 1-3 and claim 9 were rejected under 35 U.S.C. § 103(a) as unpatentable over *DiStefano et al.*, U.S. Patent 5,455,390, in view of *Lakritz et al.*, U.S. Patent 4,545,610. As previously pointed out in the response filed July 31, 2003, concurrently with applicant's request for continued examination (*see* pp. 5-7 of said response), these references offer no incentive to combine their respective teachings with one another in a manner which would meet claim 1. As previously pointed out, applicant does not deny that both of these references are from "the same field of endeavor." Both of them ultimately intend to mount a semiconductor chip in some manner to a larger structure as, for example, a circuit board, and both of them deal with ways of doing so in a manner which will alleviate stresses. However, that fact merely establishes that both of these references are within the scope of the art which would be considered by the artisan under § 103. M.P.E.P. § 2141.01(a). It does not meet the separate requirement of establishing motivation for the artisan to combine features taught by these two references. M.P.E.P. § 2143.01. There is no such motivation here. The two references provide alternative solutions to the problem of

stress in the joints which connect a chip or a chip package to a circuit board. *Lakritz* elongates the solder elements 38 which connect a bare chip 20 to a circuit board 10, and thus, makes those solder elements less susceptible to stresses. *DiStefano* provides a chip 92 with a dielectric element 32 bearing terminals (42, Fig. 1; shown unnumbered in Fig. 6), the terminals themselves being movable with respect to the chip due to flexible leads (57, Figs. 3 and 4; shown unnumbered in Fig. 6). Those terminals, in turn, are connected by solder elements 30 to the circuit board. Thus, the solder elements 30 need not provide for stress relief as in *Lakritz*. These are two separate and antithetical ways of ultimately dealing with the problem arising out of movement of the chip relative to the circuit board. The two references, taken together, would suggest to the artisan that either approach would work; but nothing in either reference has been pointed out as suggesting that a beneficial result would occur by attempting to combine features of one with features of the other. To draw a humble analogy, one can travel between Washington, D.C. and New York City either via Amtrak or via an airline; both teachings are drawn from the travel industry, both solve the same problem, and a person of ordinary skill would consider both possibilities when planning a trip. But nothing in either teaching suggests that it would be advantageous to combine one with the other.

Moreover, the references, even if combined, would not lead to the structure of claim 1. The Official Action alleges that it would be obvious to "modify the semiconductor device of DiStefano to include elongated solder columns as disclosed in Lakritz." The Official Action does not say how or where one would place the elongated solder columns in such a composite assembly. As pointed out above, the solder elements in *DiStefano* are the solder masses 30, and these form the

attachments to the circuit board. Thus, if any element of *DiStefano* were to be replaced by the elongated solder columns of *Lakritz*, it would be masses 30. Such a replacement, however, would not meet claim 1 as amended. Claim 1, as amended, calls for "elongated solder columns extending from said front surface of said microelectronic element" and having "distal ends remote from said microelectronic element" which are connected to the terminals, and further requires that the terminals be "exposed" at the exterior surface of the "flexible dielectric layer." In any combination of the two references apparent from this record, the elongated solder columns of *Lakritz* would extend outwardly from the terminals of *DiStefano* to the circuit board. Those elongated solder columns would not extend "from said front surface of said microelectronic element." The Official Action does not explain how or why a person of ordinary skill in the art, even if he sought to combine these references, would do so in a manner which would meet claim 1. Stated another way, in the invention of claim 1, the elongated solder masses extend between the chip and the terminal. For example, in the structure of Fig. 6 in the present drawings, solder masses 40' lie between chip 30' and terminals 26. In the combined structure which one would make by adding the two references together, the solder masses lie on the side of the terminals facing away from the chip and extend between the terminals and the circuit board, and hence do not meet the claimed combination. Because the references, even if combined with one another in the manner suggested in the Official Action, do not meet the claim, the § 103 rejection should be withdrawn.

The rejection should also be withdrawn as to claims 2 and 9 for the same reasons.

Claims 4, 5 and 8 were rejected under 35 U.S.C. § 103(a) as unpatentable over *Lakritz* in view of

Tanaka, Japanese Publication HEI 02-295699 (1990). The claimed invention of claim 4 includes solder masses including "columnar inclusions dispersed therein." The plain meaning of the phrase "columnar inclusions" denotes elements which constitute a separate phase from the surrounding material ("inclusions") and which are elongated or "columnar." Moreover, the claim requires that the columnar inclusions be oriented in a particular manner, *i.e.*, "oriented preferentially in the direction between the pads." The Official Action does not assert that ***Lakritz*** teaches any "inclusions," but instead apparently relies upon ***Tanaka*** as teaching "a solder mass that has particles of copper," *i.e.*, inclusions. However, insofar as is apparent from this record, ***Tanaka*** does not teach "particles of copper" as alleged. The only section of ***Tanaka*** cited in the Official Action is the abstract, apparently the abstract in the English language supplied with the Official Action entitled "basic abstract." That abstract simply teaches a solder composition which incorporates lead ("Pb"), tin ("Sn") and copper ("Cu"). Insofar as one can tell from the abstract, all of those materials are present as a uniform composition, *i.e.*, a solid solution. Nothing in the abstract is seen as suggesting that the copper present in the material is in the form of "particles of copper," as distinguished from atoms of copper dispersed within atoms of the other metals in the solid solution. Further, the Official Action does not point out any reason to believe that any proposed copper "particles" would be "columnar," as recited in claim 4. Manifestly, nothing in the Official Action or in the abstract suggests any reason to believe that any such "columnar" particles would be oriented in the manner also recited in claim 4, *i.e.*, "preferentially" in a particular direction, as opposed to in random directions. The teachings relied upon for the rejection manifestly fail to suggest the claimed invention

as recited in claim 4, and the rejection must be withdrawn as to claims 4, 5 and 8.

Claims 6 and 7 were rejected under § 103 on *Lakritz* in view of *Tanaka*, further in view of *Garner*, U.S. Patent 4,581,680. *Garner* is merely relied upon as teaching solder masses extending in an oblique direction. *Garner* is not relied upon as teaching anything which would remedy the fundamental deficiencies of *Lakritz* and *Tanaka* pointed out above in connection with claim 4. In this regard, the citation to *In re Aller* in connection with "differences in concentration or temperature" is not understood. As pointed out above, claim 4 and, hence, claims 6 and 7, incorporate specific recitations as to the presence of "columnar inclusions." Regardless of the copper concentration in the *Tanaka* solder, nothing in *Tanaka* suggests that the same is present in the form of inclusions, as opposed to a solution.

New claim 10 has been presented. This claim incorporates recitations similar to the recitations of claims 4 and 6, but without the recitation of columnar inclusions discussed above with regard to claim 4. Like claim 6, claim 10 specifies that the pads of the various pairs are offset from one another, and that the solder masses extend oblique to the vertical and horizontal directions. Moreover, new claim 10 provides that the offset directions or all of the pairs of pads are the same "so that all of said elongated solder masses slope in the same direction." The only reference of record which has been pointed as teaching anything relevant to sloping elongated solder masses is *Garner*. In *Garner* (Fig. 2), solder masses at different portions of the assembly manifestly slope in opposite directions from one another. Moreover, that arrangement is a fundamental consequence of the *Garner* teaching. In *Garner*, the various slopes of the various solder columns arise from heating

and cooling of the assembly, *i.e.*, the slopes are due to the differential thermal expansion and contraction of the components. They are initially fabricated with the elongated masses straight; shrinkage of circuit panel 2 relative to "ceramic chip carrier 1" causes the pads P2 on the circuit panel adjacent the periphery to move towards the center. This arrangement inherently results in pads which have opposite slopes at opposite sides. Nothing in any reference of record has been pointed out as suggesting the arrangement in which all of the elongated solder masses slope in the same direction, as shown, for example, in Figs. 9, 10 and 12 of the present drawings. New claim, thus, is believed allowable over the art cited in the rejection.

The cover sheet of the Official Action (Form PTO-326) indicates that the proposed drawing correction filed in November 2002 is approved and that corrected drawings are required. A set of drawings including all of the previously-approved corrections is included herewith. Such a set was previously furnished, but apparently has not been made of record. Therefore, it is respectfully requested that the drawings presently on file be replaced by the new drawings forwarded herewith.

As it is believed that all of the objections and rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which she might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: March 17, 2004

Respectfully submitted,

By_____

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